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OFFICE RECORDS OF THE ST. LOUIS WATER DIVISION, DISTRIBUTION SECTION[1]

By Thomas E. Flaherty

This paper will give a brief description of the organization for the planning, direction, and execution of the work of the distribution section of the St. Louis water department, and a somewhat fuller description of the recording of the work by clerks and draftsmen and of the methods of making corrections and additions and of supplying missing information.

The personnel of the force comprises an engineer-in-charge, assistant engineers, superintendents of construction, labor, stables and vehicles, meters, inspection; a chief draftsman, chief clerk, and the draftsmen, clerks, stenographers and helpers working under these men.

For distribution purposes, the city is divided into six districts, each having a station building, with a station foreman in charge. The most central of these stations is used as the construction superintendent's headquarters, and is known as the "main distribution office," from which all orders emanate, and to which all reports are sent. Another station, known as the "pipe yards," is used as a supply depot and meter testing station. Each district is divided into sections, in charge of section men reporting to the station foreman.

All material is tested before being used; the pipe, valves, hydrants, special castings, and fittings are tested at the place of manufacture, and all other material at the City Testing Laboratory. The test records are kept at the main office in the City Hall. Pipe for contract work is delivered by railroad to depots in different parts of the city, convenient to the work. All other material is stored at the pipe yards and delivered as needed. Records are kept at the pipe yards showing in detail the exact stock on hand at all times.

On receipt of petitions for water mains from proprtye holders on certain streets, or upon notice from the Street Division that certain streets (without water mains) are to be paved, or when new mains appear to be needed for distribution purposes, record cards are made out, showing the names and extent of the streets. An inspector then ascertains the number and story-heights of all houses on the street, and the kind of pavement, if paved. An engineer then determines the size and length of pipe, number of fire hydrants, valves and special castings needed; estimates the cost of material and labor and total cost, and tabulates these items on the card. The engineer-in-charge will then place on the card a check mark in such a way as to show at a glance whether the work is recommended or not recommended. In a somewhat similar way various requests for additional fire or sprinkling hydrants, private connections, fire lines, etc., are received, considered, and either recommended or not recommended. These records are then filed for future reference.

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[1] Read before the St. Louis Convention, May 16, 1918.

All contract work recommended must be approved by the Board of Public Service and contracts awarded for the work. A record is kept, year by year, of all bids received, and the supply clerk keeps a card index of the current prices of all material used by the Water Division. On pipe lines, lowerings, etc., the engineers make plans and profiles of the work, stake out the line and enter their notes in the customary engineer's field book. The plan and profiles and a copy of the engineer's notes are then given to the contractor, or in case of work to be done by the Distribution Section, to the Superintendent of Construction, with instructions to lay the pipe, castings, etc. On small jobs simple instructions are issued to do the work, accompanied when necessary by sketches and memoranda giving all necessary data. On the larger jobs regular pipelaying inspectors are assigned. On the smaller jobs, the station foremen act as inspectors. Longer jobs (not contracts), pipe laying, and pipe lowering are done by pipe-laying foremen in charge of what are known as "floating gangs." These men work in all sections of the city, reporting to the Superintendent of Construction at the main office.

The pipe-laying inspectors keep a daily record of labor and material used, and obtain and record measured locations of all pipe, hydrants, valves and special castings, etc. This record is known as the "inspector's notes." On the smaller jobs and routine work the section men fill out a "daily report sheet," ruled in three columns, viz: "Name," "Time," "Work done and material used." The station foremen obtain and record the measured locations, which, with the "daily report," are collected by the Superintendent of Construction and brought to the main distribution office. Here, under the direction of the Chief Clerk, a stenographer types these memoranda into sheets known as distribution notes, if the work is done for the city, and "private connection notes," if done for private parties.

At the end of each month the chief clerk forwards to the chief draftsman a "recapitulation sheet" of all "distribution notes" and "private connection notes" sent down from the main office. This list is checked against the chief draftsman's "posting record," and must agree with it, so that no notes can be lost in transit between offices. The engineer's notes, profiles, distribution notes, and private connection notes are now turned over to the chief draftsman, who numbers the notes serially, and enters them in a "posting book," and is then responsible for the correct platting and recording of the work done on all the drafting room records, and of indexing and filing these records, so that they will be instantly available when needed.

The regular drawings of hydrants, special castings, valves, tools, buildings, etc., are filed in a vertical steel plan file, and indexed in the usual way. Profiles and foreign drawings are rolled up and filed serially in numbered tubes in metal pigeon-hole cases, and card-indexed according to subject matter.

The draftsmen may then post the maps and other records in the following order:

First Posting.—This is done on the distribution map. This is a map of the entire city, on a scale of 1320 feet to the inch, on which high-pressure mains are shown in blue and low-pressure mains in red. The size of the pipe is accurately indicated by the thickness of the line; $\frac{1}{5}$ inch indicates 48-inch pipe, $\frac{1}{6}$ inch 36-inch pipe, $\frac{1}{8}$ inch 30-inch pipe, $\frac{1}{16}$ inch 20-inch pipe, $\frac{1}{20}$ inch 15-inch pipe, $\frac{1}{32}$ inch 12-inch pipe, $\frac{1}{40}$ inch 10-inch pipe, $\frac{1}{64}$ inch 8-inch pipe, a single thin line 6-inch pipe, and a single thin dotted line 3-inch or 4-inch pipe. No hydrants, valves, or special castings, except the separating valves between high and low pressure, are shown on this map. On all other records the size of the pipe and nature of the special castings, etc., are shown by the conventional signs or symbols. Thus three lines close together, two of them dotted, enclosing a central full line, indicate 48-inch pipe; two full lines enclosing a central dotted line, 36-inch pipe ;three full lines 30-inch pipe; one full line and one dotted line, 20-inch pipe; two full lines, 15-inch pipe; two dashed lines, 12-inch pipe; single dashed line, 10-inch pipe; single dot and dash line, 8-inch pipe; single full line, 6-inch pipe; single dotted line, 3-inch or 4-inch pipe, the size being written on the line if necessary. Conventional signs are used for different types of valves, hydrants, and other accessories.

Second posting; section maps. These maps are on a scale of 200 feet to one inch, only nineteen being required for the entire city. About 125 city blocks appear on each section map. Cloth blue prints of these maps, mounted on map rollers, are kept at the various stations. These maps are invaluable, especially to the "night station foreman." The numbered separation valves are shown on these maps as well as all other valves, special castings, hydrants, etc. If a water main of any size should burst or a joyrider break off a hydrant and a flood threaten any locality, the foreman refers to the map of the scene of the accident and orders his gang to close the proper valves until repairs are made.

Third posting; loose-leaf plat book. These plats are on a scale of 100 feet to the inch, 278 of them being required for the entire city. About thirty city blocks are shown on each plat. On these plats a given city area occupies four times the space it occupies on the section map, and of course shows the pipe, hydrants, valves and other specials far more clearly and distinctly. These plats are consulted on all occasions where exact measured distances, pressures, grades, etc., are not required.

Fourth posting; street intersection cards. These are on a scale of 50 feet to the inch, over 6000 being required for the entire city. These cards, when completed, show on one-half of the card, the building and curb lines of all street intersections, and measured locations of all water mains, valves, hydrants, etc., within a radius of one-half the distance from the given street intersection to the next nearest street intersection along any street. On the other half of the card are listed references pertaining to the water main, i. e., the engineer's book and page, inspector's book and page, profile number, date of laying, pressure in pipes, and grade of street intersection at center lines of street. On the back of the card appears the name of the street, under which the card is classified and alphabetically filed, and on the front the name of the intersecting street. A serial number on the back indicates the place of the particular card in the "run" under which it is indexed. A transparent envelope protects the card from soiling or blurring. These cards are in daily use, answering the thousand and one queries received from the public or from other city departments, where exact and specific information is required.

Fifth posting; separation cards. These are made for all intersections at the boundaries of high and low districts, and differ from the street intersection cards only in that the high pressure mains are shown in blue, and low pressure mains are shown in red, and the numbered separation valves are shown.

Sixth posting; sprinkling hydrants. A very complete and accurate list of sprinkling hydrants is kept. This list shows the number of "Sprinkling Districts," 42 in number, in the city, showing the number and location of the hydrants in each district, the total number which on January 1st, 1918 was 1894 hydrants.

All additions or removals during the previous year, and deductions to be made on account of oiled streets, and the amount due by sprinkling contractors for the use of the hydrants, are also accurately shown. In addition to this list, all hydrants are shown on a complete city map, scale 1320 feet to the inch, divided into sprinkling districts. Each hydrant is numbered, the number appearing on the map adjacent to the hydrant. Enlarged maps of each section on scales varying from 200 to 600 feet to the inch, are also kept so that the distances between hydrants can be scaled at any time.

Seventh posting; drinking fountains. All fountains are shown on a complete city map, scale 1320 feet to the inch. The character of the fountains is designated by conventional symbols for the various fountains installed by the city, by humane societies, saloons, etc., these fountains being for horses and in some instances for dogs or other small animals. Special symbols also indicate special ordinance fountains, metered fountains, or the new type known as "bubbling" fountains, from which citizens may drink when thirsty without danger of contamination. A numerical "District Book" of fountains and an alphabetical card index giving exact location, ownership, date of installation, memoranda relative to the maintenance and care and condition of the fountains, date of withdrawal, etc., are also kept.

Eighth posting; pressure records. Pressure gauges are maintained at six carefully selected points in the city, and the charts from them are collected and filed daily, thus keeping, as it were, a finger on the

"Water Pulse" of the city. In addition, numerous special gauge-readings have been taken at a number of well chosen points, at various grades, and platted on a city map, scale 2000 feet to the inch. By making allowance for differences in grades, we have computed reliable maximum, minimum, and average pressures, for practically the entire city. These pressures are recorded on the "Street Intersection Cards."

Ninth posting; pitometer records. A large number of pitometer readings have been taken at points selected with a view toward determining the direction and volume of the flow, by night or day, from the pump mains into the feed mains, and thence into the distribution mains to the consumer. These readings are recorded on a complete city map, scale 800 feet to the inch. On this map are drawn three sets of concentric circles, at one-mile intervals, covering the entire city. The center of one set of these circles is at the Baden High Pressure Pumping Station, one at the Bissell's Point Low Pressure Pumping Station, and one at the Compton Hill Reservoir.

These are the principal records to be posted; and as each record is posted, the draftsman marks on the inspector's or distribution note an abbreviation of the name of the record, as "D" for distribution map; "SP" for sprinkling map, etc. When the notations on the note show that all records have been posted, the chief draftsman OKs the note, and it is then pasted in a numbered "Gummed Stub" book. As the sheets are pasted in, they are paged serially, and index cards made up alphabetically, by street names.

In all municipalities, inherited records are more or less faulty and incomplete, owing in a large measure to continual changes in administration, poor systems in the past, the personal or human equation of the employes, or in some instances, as in that of our own city of St. Louis, to a fire at the City Hall some years ago, which destroyed a number of records. It is frequently found that measured locations are either altogether missing, doubtful, or evidently incorrect. To remedy this condition as far as possible, two methods were used with great success by the present administration, in the St. Louis Water Division:

1. Copies of the section maps previously referred to were laid out on a table at the main office of the Distribution System. The section foremen were then called in, one after another, and, with the chief draftsman, went over the maps carefully and minutely.

Where the section man recognized an error, or was in doubt as to any point, notes were made of the error or doubtful condition, and the corrections made when correct information was obtained, by inspectors delegated to this work. A very large number of important corrections were made in this manner.

2. In the drafting room a set of cards known as "Information Cards" (known among the draftsmen and engineers as "I. C." cards), are kept, and on them are entered requests for information on any doubtful point, for corrected locations, or for missing locations which develop in the course of the day's work. On each card is marked the number of the section, from which the information desired is to be obtained; and on the back of the card is marked the name of the street under which the card is classified. On the face of the card is marked the intersecting street, very much as in the case of the street intersection card. The cards are then grouped by sections, the streets being alphabetically arranged in their group. It is then a comparatively easy matter to send out inspectors to obtain the necessary information or obtain it direct from the section man in charge of the section.

By use of these two systems the faulty or missing information cases have been reduced to a minimum, and the value of the record system has been rendered nearly 100 per cent, in the present distribution system.